Notebook Series -- Notebooks by Experimenters Other Than Edison
Battery Experiments -- Experimenters' Books
P. D. Payne Notebook, N-20-11-01

This notebook was used by Paul D. Payne during October 1920-August 1921 for notes on storage battery experiments. There are also a few additional entries from July and September 1922. Included are notes relating to battery applications and improvements, such as a miner's lamp, w-type audion, and hand flashlight. There are several references indicating that Payne was working under Edison's supervision. Two notes in Edison's hand have been inserted into the book. The front cover is marked "P. D. Payne." The book contains 143 numbered pages, some of which are blank, followed by 4 unnumbered pages.

Record of Experiments

by

[illegible] H. [illegible]

Nov. 1 1920

work on W. type Audion
Cell.
Shop order no. C 716 X 5

manufacturing 100 cells
& 30 H.P.s part Gov't tests
S.O. no. C 300-487

Notes

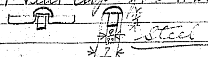
Cadmium Solder
$1.10 per lb.

Oxygen $.015 per cu. ft.

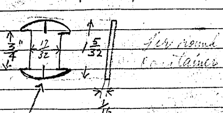
acetylene .025 " " "

Nov. 2.

Mod. 1 vent cap for W-2 cell


1/4
9/32
7/16
Steel

Mod. 1 H.R. spacer for W-2 plates

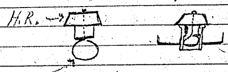

3/4"
17/32
1 5/32
1/16
for round container

Slot for pos. 1/32" of center to centralize plate.

4

Nov. 2

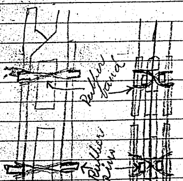
mod 2 vent cap for W-2 cell

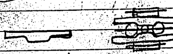

H.R.
spring wire

5

Jan 5 1921

Making new model which does away with rubber piece at bottom and vertical rubber pins using instead 4 rubber pins horizontal and secured with 2 rubber bands.

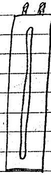

Rubber band
H. Rubber pins

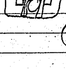


Showing shape of pin

Jan 12, 1921

Scheme for eliminating rubber bands and preventing element from turning make groove in two sides of can blank to hold element firmly. Rings on pos. tubes will prevent pins from falling down



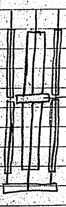


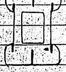
Turned completed cell over to Mr. Edison this date.

Jan 21 Rec'd Audion cell model from S.B. With criticisms.

Jan 24.

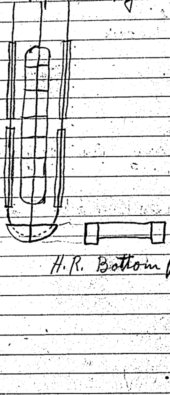
new model


H.R. ring made from regular pin separator


H.R. bottom holder

Jan. 28

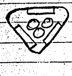
top held by cover

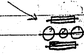


H.R. Bottom holder

Begin Jan 26 1921

Run tests on triangular cell made by designer At S.B. in Comparison to the arrangement of Mr. Edisons





Efficiency as Compared to AA

°8 Triangular	cell	42.7%
~~000~~ Square	"	76.5%

Audion Cell

of this type, negative pockets crimped with regular flat dies showed on discharge to 1 Volt 2.45 A.H. 2.84 W.H.

Corrugating iron pockets after they had been crimped with flat die brought it up to 2.90 A.H 3.42 W.H. on 2nd run and to 3.00 A.H 3.60 W.H. on 3rd run. to 1 Volt

Loaded iron pockets with 7,000 mg iron, crimped with flat dies
First run 3.15 A.H. 3.73 W.H.
2nd " 3.3 " 3.96 "
to 1 Volt

Feb 16,

Loaded pockets with 7000 mg iron crimped with flat dies then

Feb 16

~~with Corrugated Positive charge at 400 ma at 6 P.M.~~

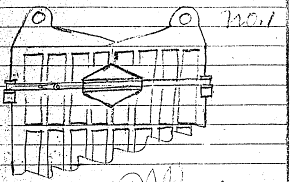
Feb 21

Made up 1 cell with 7000 mg iron. Pockets pressed first with flat dies then Corrugated. Positive plate has 2 regular 1/4" tubes. Started running this cell and making graphs of characteristics

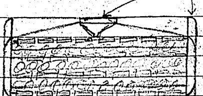
S.O. No. C 716X6
Nov. 3

Exp. on new type

A-4 - A-6 battery



The objection to this method is the slim blocks of rubber running into [illegible] rubber



Notes

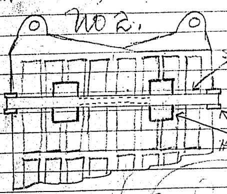
Cost of 2 rubber side holders ([illegible]) .54

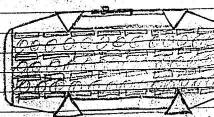
37 pins between plates .44

Nov. 4

Exp. on A-4 Cell in #6 Can.

No 2.





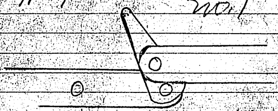
Mr. E wants this side separator eliminated

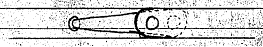
Too much rubber

without side separators the bands draw plates together when sufficient strain is obtained to hold parts in place

Nov. 4

A-4



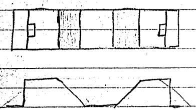


Exp. on method of fastening Steel band around Element

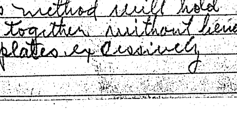
Nov. 5 + 6
working on details A-4 - A6 Etc.

Nov. 8 + ½ 9th
Working on A-4 6 exp. no. 3

Spacer for A-4 element Exp. no 3



Nov. 15
Exp. no 4



This method will hold parts together without bending plates excessively

Exp no 4

This method will require

40% of the metal and

$33\frac{1}{3}\%$ of the rubber used

in the arrangement

As given to me.

weight of 2 side pieces
and rubber end rods
in original arr. $6\frac{1}{2}$ oz.

weight of rubber parts
in experimental arr —
$2\frac{3}{16}$ oz.

Dec. 1

Mr. E. wants experiment
with asbestos separators
instead of rubber pins.

Exp. no 1

Reduce thickness of element
.200" by using asbestos .055"
thick. this will bring
plates .025 closer together
thereby increasing
capacity and preventing
iron from sifting out
of pockets.

Dec 3.

The "lug" is to eliminate
chafing between plates.
So that rings on
pos tubes will not
puncture the [illegible]
asbestos

Dec 3

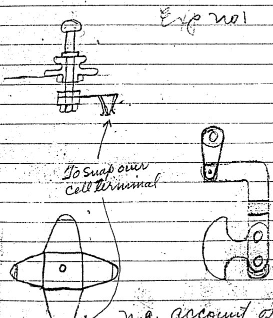
Reduced space between
plates and put in .055"
asbestos (2 sheets) allowing
it wide enough to
lap over $\frac{1}{4}$" on sides,
put on iron bands
to hold it in place

asbestos used in this model costs .365 cents and old style bottom insulator costs?

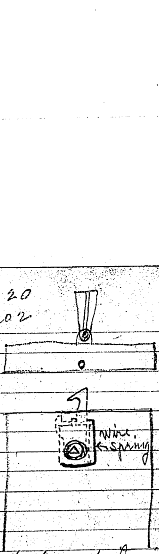
This exp. proved impractical on acc. too low internal resistance when plates are close together. By using proper thickness of asbestos it would work very well but the cost which we are trying to cut down would be increased

Exp. work on carbon hand lantern, simplifying and improving construction.
S.O. no. C-716X7

Exp no1


To snap over cell terminal
n.g. account of variation of position of cell terminals.

Nov. 20
Exp no 2

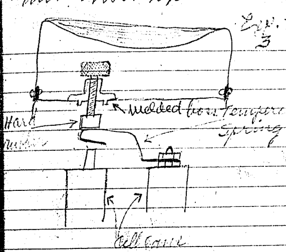

wire
spring

Method of fastening cover

New size case Dec 9
$3\frac{7}{16} \times 3\frac{3}{4} \times 6\frac{13}{16}$

Mon Nov. 22

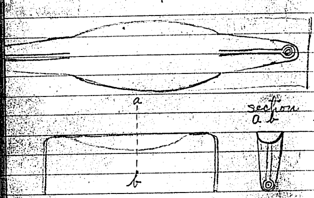
Exp. no
3


Hard rubber
Molded from tempered
Spring
cell case

make 3 parts take place of 52 which were used in first model

nov. 24

Blank



New Type Handle

Exp. no4

Work on C-716 X 7
Completed Jan 14, 1921

Dec 13

Rec'd from Esh 2 each
M-12 + L 30 Cells
for experiment on
hand lantern.

want to adapt this lantern
to 2 or 3 different size
Cells

M.12 will light 6 CP light
brilliantly 3 hours
L-30 8 hours

Jan 14 turned
Completed hand Lantern
over to Mr. Edison

old model 143 parts (+ bat.)
new " 70 " "
old " $3\frac{3}{4}$ lbs "
new " 3 " "

Feb 22

Reced from Mr. Edison
1 Grether & 1 Duland hand
lanterns. (Mr. Meadowcroft)

Jan 12, 1921

Experiments on Improved Mine Lamp (Portable)

June 22:

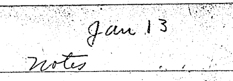
Make experiments on electrolytic surfacing of aluminum for reflectors using sulphuric acid bath + aluminum for anode, high amperage

Jan 13

Notes

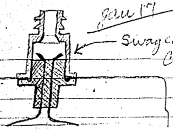
1 Shorten flexible cord protectors + make both of same material.

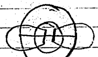
2 Eliminate present contact plates + hard rubber in Container covers.


Spring Clips on cover

This will also do away with spring pole terminals

Jan 17

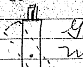

Swaged through cover



Feb. 8 & 9

Experiment on non-Spill value for M. type cell to do away with long pipe in cap so that an element of greater Capacity may be used

Made test on reliability of non-Spill value as used in L-type Cells.



Gave Cell this movement 54 times per min. 5000 times. no leak

Then gave it Same movement about 15 per min. 1800 times no leak

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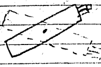
Feb 9

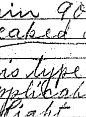


Gave cell this movement 54 per min. 45,000 times no leak

Same movement 10 per min 900 times Leaked about 4 drops.

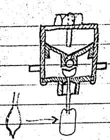
This type value not applicable to miners' Light as they lie on their Sides to do the most of their digging

Feb 10



Sketch of tentative design for non-spill value.

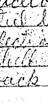
Feb 11



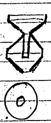
sketch of tentative design for non-spill valve.

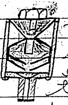
made model of this and mounted it in glass tube to observe action.
Steel ball sticks and electrolyte trapped in shell does not flow back freely into can.

Feb 16



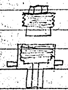
made model of this with slide valve arrangement very effective but allows no vent for upper chamber to allow any chance electrolyte to flow back down.

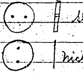




made model of this type and depended upon the air pockets to prevent leakage but when the electrolyte came against it with a rush the air packet was displaced after which the electrolyte would run out freely when can was inverted.
This model was first tested in a glass tube but on account of the small volume of liquid in the

tube the defects failed to appear and the device appeared to be very effective in preventing leakage





This device has a steel disc .020" thick with 2 holes 180° apart half way between center and edge and a nickel disc .002 thick with 2 holes located as in the steel. The nickel disc is clamped on top of steel with all 4 holes 90° apart the gas in Can Will build up sufficient pressure to raise nickel disk and escape

Feb 21.

Received from Fagan 1 Wheat Variable mine Lamp complete.

This Lamp has a lead battery, the case is made of hard rubber. Headpiece & reflector housing are made almost completely of hard rubber. Comparison with the Edison is as follows

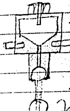
Disadvantages

1-weighs 1 lb more.
2-Is bulkier
3-Is easily broken by dropping
4-Has lead battery which will not give more than 50 good cycles
5-Battery is hard to renew
6-Has poor Reflector
7-Lamp is out of focus

Advantages

1 is more dependable in service as it has 2 lamps (?)
2 Has outside contacts for easy charging
3 Cannot rust
4 Has switch so that lamp may be easily turned out when going from lamp house etc to mines
5 Exclusive of battery has 29 fewer parts than the Edison

Feb 28

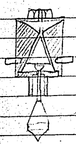


made model of this type using 1/4" steel bearing ball with # 54 hole through it to line up with hole in body of cap when cell is in upright position. upon tilting 28° holes become out of alignment + close of valve.

The difficulty in making this work properly is that when ball is held tightly enough to seal the weight necessary to move it would be prohibitive.

week ending march 5

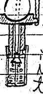
March 1



made model of this type & tested it out Made on 50° Angle valve not heavy enough to release itself quickly in upright position. not proper angle. also leaks slightly

made 2nd model as above with angle of 82° Releases very well but leaks

week ending March 5



made model of this type using the standard ball with a rigid pin in it. The valve is not connected to the weight (ball) but is held against its seat by a small spring. when cell is in upright

position the ball rests in its seat and end of pin comes to its lowest position pushing the valve downward off its seat. made tests on this and found that it leaked. not however, until the test was run for 5 min. this led to the conclusion that the valve was prevented from seating by particles of iron in the solution.

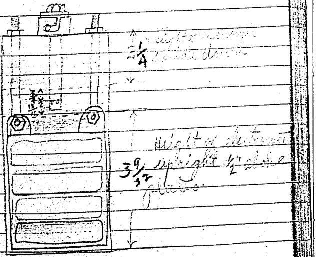
I then protected the valve by wire gauze of 150 mesh and the valve functioned fairly. Tried first a spring made of 5 turns .007 wire this was too weak. next used 5 turns .008 wire this was better but not quite strong enough. Then tried 5 turns .009 wire. this works well.

March 7 '42

59

Mr. E. [illegible] [illegible]
lamp made [illegible] [illegible]
element [illegible] [illegible]
and high [illegible] [illegible]
the same [illegible] [illegible]
value used for M-8.

This will [illegible] the
can $1\frac{23}{32}$" higher than that
used for M-8.
M-8 is $5\frac{1}{2}$" high
period $7\frac{7}{32}$ "



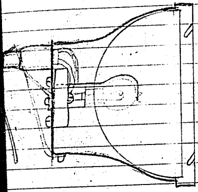
$2\frac{1}{4}$
weight of element plate down
$\frac{11}{16}$
$3\frac{9}{32}$
weight of element upright $\frac{1}{2}$" above plate

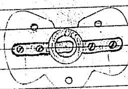
March 8

M. 8 element requires
7/8" electrolyte in can to
cover the plates

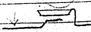
Element double M-8 size
would require 1 3/4" to a
cover plates

March 9

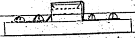




H.R. Base (may be made of porcelain)

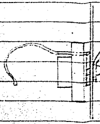


Brass contacts for lamp



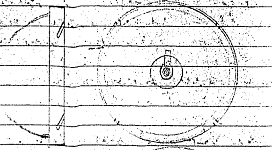
This base will be screwed to head piece case by 3 8-32 Screws

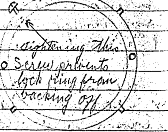
March 10 & 11



Showing location of lamp-holding spring held by rivet through back of head piece

Same rivet will also hold one part of cap hook

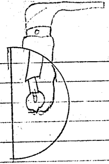




Showing method of clamping & locking lens against gasket. This ring is turned tight by means of a spanner

---

Mch 18



With this regular arrangement the socket and lamp base, either of them produce a shadow in the beam, they block of a considerable amount of the reflected light and an appreciable portion of the direct light from the reflector.

The socket, boss for holding socket and the gooseneck cable receptacle all are expensive parts.

The bezel and method of securing same are expensive and the headpiece generally is much too heavy.

Mch 18

The tentative design of my new model shown on preceding pages will do away with the costly goose-neck, hose & socket.

The shell will be drawn from 1/32 steel and the bezel arrangement will be very simple as compared to regular arrangement.

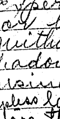
In changing the position of lamp & putting it in center of reflector with end of bulb pointing outward the lamp in present use may not be used as the tip produces a shadow.

The lamp retaining spring will also produce a shadow as it obstructs the direct light going outward.

March 18

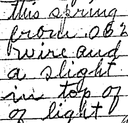
Experimental springs - for holding lamp without producing shadow.

(using tipless lamps)
tipless lamp will cost 20% more than regular



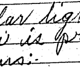
This spring is made from .0625 spring wire and produces a slight shadow in top of circle of light Thus:

hole in spring
13/32



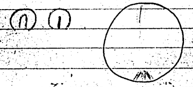
In the regular light a slight shadow is produced in bottom thus:

Also if lamp is placed so the one part



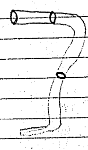
filament that comes

between observer and the other part a shadow will be made thus:

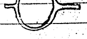


This is not possible in the new model as the one part of filament cannot come between other part & observer and the shadow produced from this cause will be on the reflector and be eliminated by the diffusion of reflected rays.

another experimental lamp retaining spring made with stream line cross section



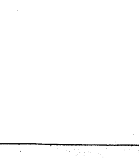
This, I find, is not practical for the purpose on account of the cost of manufacture



made up a spring of .046 wire like one on page 69 but found it too flimsy.

made one of .055 wire and increased size of ring to $\frac{15}{32}$ this seems to be very good as it produces so small a shadow that it is scarcely visible and mechanically it is amply strong.

march 20

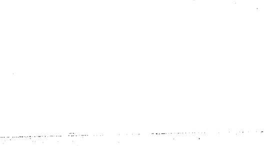


Showing new experiment for bezel The angle flange will draw glass down upon the rubber gasket and will compensate for varying thicknesses of glass.

This may be made in 3 operations with no waste of metal and has only 3 parts whereas mr. monahan's

new model requires, 8 operations, has 5 parts and wastes 5.4 sq. in of metal for each bezel.

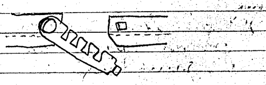
march 23



Showing another method of securing bezel ring. This will be much easier and quicker to attach and remove than the one using a screw.

On account of the teeth being made in the extended end of the bezel it is too rigid march 24+5

to function properly and if this fastener were made from separate pieces that would increase the cost of bezel and it would no longer be simple in construction



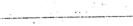
made model of this type fastener and it works very well.

The main trouble is that it is impossible to put the notches close enough together so that tension can, in every case be held at the maximum attained by hand pressure.

By using a tool for clamping bezel this device

would work ok.

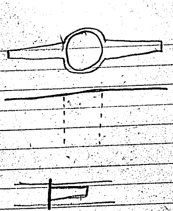
march 26 28 29



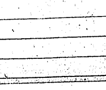
Cable lock made from 1 piece .045 Spring wire

This holds cable by drawing into tapered hole in receptacle.

On account of the small area held this device scars up the rubber badly

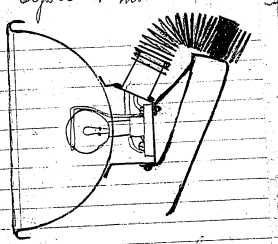


another type of cable lock which will not mutilate rubber on cable but does not hold quite firmly enough.



made one with 3 prong like this which holds like a bull dog.

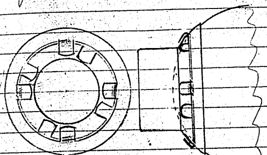
April 1 model 2



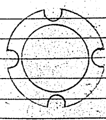
Showing general arrangement of lamp, retaining spring, socket, etc.

By removing cap from back of headpiece it will not be necessary to disturb bezel for repairing cable or renewing lamps as lamp, safety spring, socket receptacle and cap hook are all contained in the one unit.

April 4



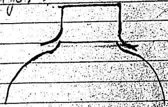
Showing means of holding capon back of head-piece by means of a ring spot welbeded onto hiddpiece shield.



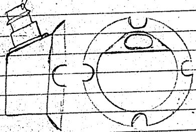
Plan view of Cap

April 6

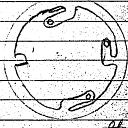
To make cap practically airtight on back of headpiece & will have a slight radius on shell to fit into bottom of cap.



April 7



April 15



Showing method of locking cap on back of headpiece. Compared to method on page 79 this is very good.

One ear will be turned up and have a hole in it for lead seal.

April 18

Mr. Ragan Called.

1 objects to my arrangement of contacts in container cover on account of the charging connections coming on the 2 inside poles while their charging equipment is made for charging from the outer poles.

2 says headpiece does not need to be absolutely airtight.

3 miners nowadays do not ever work lying down.

4 Headpiece must have provision for seal or lock.
He cited a case of English miner putting off a

shot by removing
bezel of lamp and
making contact at
lamp socket.

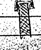
5 no shooting is done
in daytime all of it
is done by a regular
gang who do nothing
else.

April 20
Went to Pittsburg
to collect information
regarding mine lamp
Returned April 23

April 25
Changed method of
holding cap on back
of shell. Instead of
attaching lugs to
back of shell I will
simply punch them
out of shell itself

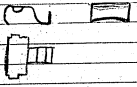
April 26

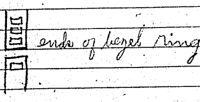
I find that the only
kind of gasket which
will give sufficient
resiliency to prevent
breakage of glass
is a band of soft
rubber which will
cover all bearing
surface of glass so
that it cannot touch
the metal thus:

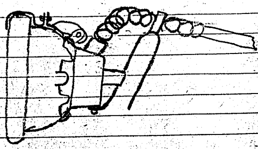


April 30

Completed model bezel
& fastener




ends of bezel ring

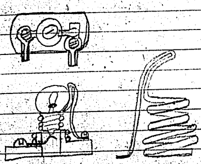


material for making
Brass headpiece Shells
Costs $15.75 per hundred
lbs.
Estimated Cost per 100
Shells $2.76

Steel for same Costs
$6.24 per 100 lbs
Estimated Cost per 100
Shells $1.09
at 17.5 lbs per 100

Shell weighs 67 g.

May 2



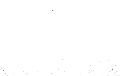
Made this experiment trying to get away from the necessity of using a ring on out of bulb.

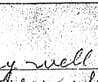
This way a regular screw base bulb is used and instead of the base dropping out or lamp breakage the circuit is opened.

This does not work

very well because when hook is bent far enough over to give it good contact when lamp is in it is difficult to insert lamp.

May 3

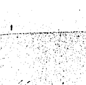


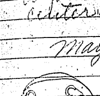


Made a spring like this which works much better on a longer spring. But the coils which hold lamp base are too flexible and

allow safety spring to push bulb out of center.

May 9





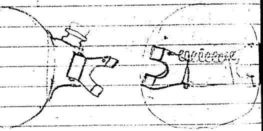
Another type of saftey spring which opens circuit on lamp breakage

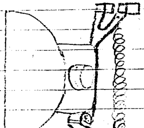
This spring holds lamp firmly on seat and allows easy removal and replacement of bulb. When headpiece is in normal position on cap lamp base will

fall out and circuit
will be opened
if springs are broken

May 19.

Made spring clips to
replace cap hooks [illegible]
& [illegible]





This h
onto Ca
Center

May 20

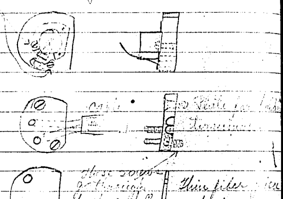
Made up 6 cells
using 6 A type iron powd
& 14 3/4 length 4" tubes for
[illegible] Clay Bureau of
Mines.
These cells did not come
up in capacity. they were
tested by research dept. S.B.

June 22
Made up 6 more, duplicate,
but in 20% KOH solution
with lithium [illegible]
ing proportions (1 cell each)

[illegible] grams per liter
2[illegible] " " "
[illegible] " "
[illegible] " " "
[illegible] " "
5[illegible] " "

50 grams per liter proves
best.

nut for holding Socket onto terminal plate


Cap
Plate for holding terminals
These screws go through back of shell

Thin fiber [illegible] which go[es] between Sh[ell] and Termin[al] Plate.

The Terminals are made by placing flat head screws [illegible] ends of wires these are held rigidly in place by a pl[ate] of hard rubber, fiber or porcelain which is secure[d] to bottom of Cap by two [illegible] The socket proper is then slipped over the protruding terminal screws and held there firmly by nuts.

May 21

Made arrangements to get ingots of Mag- nesium [illegible] [illegible]

[illegible]

Performance of 6 cells on page 93 of June 42

A. H.-Run no.

Cell nos.	1	2	3	4	5	6	7	8
1.	14.02	11.00	11.00	11.25	11.70	11.70	12.56	12.07
2	13.35	11.22	11.22	10.87	[illegible]	[illegible]	[illegible]	11.25
3	13.50	[illegible]	10.56	10.87	[illegible]	[illegible]	[illegible]	11.92
4	13.65	11.00	10.78	11.40	11.70	11.72	12.45	12.15
5	13.65	11.00	11.22	11.25	11.77	11.3	12.60	12.45
6	13.71	10.75	11.00	11.70	12.07	12.22	13.05	12.60
[illegible] rates	.75	2.2	2.2	.75	.75	.75	.75	.75
[illegible]	48 hrs 1.1 amps	24 hrs 1.1 amps	7½ hrs 2.2 7½ hrs 1.1	5 hrs 2.2	8 hrs 2.2	8 hrs 2.2	5 hrs 2.2	7 hrs 2.5

A.H. Discharge

Cell No.	Run nos. 9	10	11	12	13	14	15
1							
2							
3							
4							
5							
6							
Dis Rate							
Chg. Rate							

Weight of M-8 battery 1 lb 14 oz
" " M-12 " 2 " 9

New Edison Lamp
Wt of

Battery & Case	3 lbs 13½ oz
Cable & headpiece	11¾ oz
Headpiece only	6⅝ oz
Total	4 lbs 9¼ oz

October 20

New M-14 Cell

Cells marked "A" have iron pockets with 8.26 grams each.
Cells marked "B" have pockets with average of 9.109 grams of iron

Cells marked "C" average 0.541 grams of iron per pocket

Mine Lamp Data

Contd on Page 143

On Sept. 22 I measured the resistance of the new socket & contacts and cable including soldered terminals at battery end found it to be .084 Ohm

(over)

On Nov. 29 I measured the resistance of new socket with dummy smooth base lamp having shorted threads (Same as on Sept 22) this lamp is a somewhat better fit than previous test. It showed .0805 ohm through safety contact regular length of cable and soldered terminals at battery end. without going through safety contact it showed .078 ohm.
In comparison a screw base lamp in regular screw socket with identical connections showed .0765 ohm.

Regular mine lamp socket at 1 ampere has voltage drop of .160 volts

April 7 S.O. No. C716-R 99/6

Rec'd from Mr. Edison sketch for experiments on large battery hand flash light

Random notes before starting work on this job

Have no battery case as in ordinary flash light but have top of cell can screw right into head part.

Make 2 cells with screw ends so that they can be screwed together end to end and put switch at cell intersection.

[illegible]

[illegible] to [illegible] to determine it is [illegible] to [illegible] necessity of watering

If this process impract arrange filling hole to be sealed immediately after charge using plug of such size & shape as to make impossible to use battery in charging fixture without removing plug.

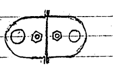
June 6 to 11

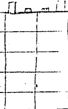
Made tests on cells A and accu. On seal cell then pressure as high as 1 volts per and then discharged

found that [illegible] cell [illegible] higher [illegible] with them. [illegible] will continue tests [illegible] after charge.

June 29

Flashlight does not need to be made after the present commercial model but for our purpose may be made almost rectangular in cross section. It will then accomodate [illegible] battery better & fit the pocket

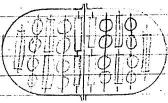




Efficiency of 1.5 Volt b
proved to be so lo
that it is entirely
impractical to use
a two cell battery
for our flashlig
On this account 2'
discontinued all tes
for comparing dry ce
to the single cell st
battery.

Am going to mak
up three batteri
of two cells each
using 8 3/4 length 5/16
tubes and 5 3" iron
pockets per cell.

The following sketch
shows arrangem
of tubes + pockets in
a cell can which is
made of 3 pieces
besides tops + botto



June 7

Tests to determine life of commercial dry flashlight battery

1-2 cell battery dated Au[illegible] 1921 lasted 13.5 hours. Battery no. 790 Burgess [illegible]

M.W. 790 battery no. 2 dated nov. burned lamp 5 hrs. rested 16 hrs. burned lamp 6.5 at end of which time it was too dim for service

705 battery (3 cell) burned lamp 5 hrs. rested 16 hrs burned lamp 6.5 hrs. at end of which time it was too dim for service

Put 705 battery on dis again after 16 hrs. rest. lasted 2 hrs. making total 13½ hrs. 2 rests

107

Put 790 battery no. 2 on dis. again after 16 hrs. rest. Lasted [illegible] hrs. making total for this battery [illegible] 13½ hrs. 2 rests

Aug 5

Amount of Li per Tube in various types of tubes

1/20 Li. g. "
H type .75 g
[illegible] " .42 g (3/16 tube)
M.S. " .41 g
Tube 16 { – 30 .46 g
L 30 10. g per cell
B type .33 g per tube

1.35 V.

Discharged Edison batt.
B and 6 c amp. lamp for
8 hrs. rested 15 hrs.
continued dis. and ran
6.5 hrs. more before
lamp became too dim
for service. total [illegible]
[illegible]

aug 9

Building 24. under normal
working conditions, use
they use 22 hand
flashlights. 18 of them
are the 3 cell type.
The 3 cell lamps are
used because they
give a little more light
than the 2 cell lamp
but for carrying in the
pocket the 2 cell lamp
is preferable.

They use thirteen 3 cell
batteries per month at
$0.31 each and 5 2 cell
batteries at $0.20 each.
The average life of
these batteries is
60 hours intermittent
Service as used in
building 24.

The list price of the 2 cell
is $2.75 while that of
the 3 cell is $3.25

[illegible] 21

am going to make
[illegible] [illegible] on magnifying
[illegible] [illegible] [illegible]
[illegible]
[illegible] [illegible] [illegible]
[illegible]

[illegible] [illegible]
[illegible] [illegible]
[illegible] the magnifying
[illegible] I expect [illegible]
[illegible] [illegible] with
[illegible] 81 - watt [illegible]
this obtained [illegible]
[illegible]
[illegible] [illegible]
[illegible] up land [illegible]
[illegible]
[illegible] [illegible]
[illegible] [illegible] [illegible]
[illegible]

Aug. 5

Completed new flashlight battery.
Cells hold 45 cc of electrolyte each i.e. 90 cc for the battery and weighs 234lbs
This battery will have a capacity of 3.75 A.H.
Charge rate 1.2 Amps for 1¾ hrs.

Put Li in flashlight batteries as follows:

No 1 .345 g. per tube 2.76 g. pr cell
61 g. per liter
(No1. same as L 20 .46 g per full length tube)
No 2 .315 g. per tube 2.52 g. pr cell
56 g. per liter.
(No2 same as G type .42 g. per full length tube)
No 3 .36 g per tube 2.88 g pr cell
64 g. per liter

$\frac{3}{16}$" ni tubes cost per 100

material	.937
Labor	.549
Overhead	1.335
	$2.821

A-type iron pockets cost per 100

material	1.40
Labor	.341
Overhead	.49
	$2.231

The 16 tubes and 10 pockets used in flashlight battery

Cost: tubes	$0.451
Pockets	0.224
Total	0.675

July 10, 1922

I want to make experiments with Palladium Black and Platinum Black and Iridium Black and the metals of each inside of Nickel, Iron Cells for absorbing the gas and converting it back to water.

This would not only keep down the pressure but eliminate the necessity of adding water to the battery provided we could make it efficient enough to work when battery is on charge.

Forming of all Cells
Regular practice

48 hrs chg ½ normal
Discharge normal to .9 Volt

15 hrs. chg normal
Discharge normal to .9 Volt

8 hrs. charge normal
Discharge normal to .9 Volt

Re [illegible] Forming Process Nov. 8th

October 21

25 Experimental Cells put on forming Charge 12:30 P.M.
Gave them regular forming Charge as on preceeding page

First 3 runs after forming showed capacities as follows: A.H. to 1 V. at 2.8 Amps Discharge

A Cells	1	2	3	4	5	6	7	8
Run No 1	10.08	10.08	9.80	9.80	10.36	9.80	9.80	9.80
2	11.20	11.20	11.20	10.50	11.48	10.50	10.50	10.50
3	10.50	10.50	10.50	10.22	11.20	10.22	9.52	9.52
B Cells								
Run No 1	9.52	9.52	9.24	9.52	9.30	9.52	9.24	9.52
2	11.20	9.80	11.20	11.20	9.80	11.20	10.08	11.20
3	9.52	8.40	10.22	9.52	8.40	9.52	9.52	10.22
C Cells								
Run No 1	9.80	9.30	9.24	9.80	9.80	9.52	9.52	9.80
2	11.20	9.80	9.80	11.20	10.50	9.80	10.08	10.50
3	11.22	8.40	8.40	10.22	9.52	9.52	9.52	9.52

Nickel plating Solutio

Double sulphate of nickel
and ammonia
dissolved with 1 gal hot
water

Cleaning Sol
1/2 lb Caustic pot, Boil wa
2 gal water
Brass or copper pickle
1/2 lb. pot. cyanide per gal wa

Steel or iron pickle
1/2 lb hydrochloric per gal wat

May 5

Max. for new Lamp
42 mm F1 Bulb
38 min av. 40
LCL av 27 mm.

G1 Bulb max 44
min 40 av. 42
LCL 29

E1 try to make same
as F1

Sept 20 1922

Data on socket of latest design.

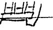
Safety spring .043" wire 4 turns $\frac{5}{32}$" pitch
Inside dia .560 $^{+.015}_{-.000}$

2-56 filister head screw
$\frac{5}{32}$ long.

4-36 R-H. screw $\frac{7}{32}$ long

Flashlight

a element has perforated bottom

Separator & sheet ends on pos 

B has not

New Mine Lamp Weights July 3 1922

Complete	4 lbs.	13 oz
Bat. + Cont.	3	15½ "
Headpiece only		7¼ "
Cord "		6¼ "

Voltage of Phot. Std. 1.675

∠ screen between unknown
and Phot. 2.80 - 16

Treatment of H.R. for
use in alkaline
Storage Batteries

Soak 48 hrs in Sodium
Hypochloride

May 2
Cent. Contact Spring for
new mince Lamp 16.6 Wire
11 turns .115" outside Dia

Interfunctional purchase
order P 14880 to Conn
plating for July.

[ITEM(S) FOUND IN BOOK]

Payne.

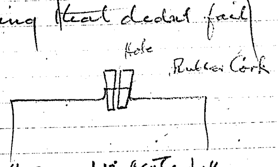
We once made a humidifier that will be OK for Hand flash lamp. Charging. it will have to be redesigned & Cheapened, Here is some old pamphlets see me

Edison

It can be made Very small for flash lamp,

Payne

This I have tried on A4s in destructive packing Cases the only thing that didn't fail



A4 size 1.12 cents dollar 12 per hundred 118 size probably 75 cents a Hundred This is deadly practical —

[ITEM(S) FOUND IN BOOK]

Electrolyte used in exp. Cells

21% potash with 45 gr. 100% lithium per liter (6.75 gr per cell)

Regular M-8 uses 50 gr. per liter (3.3 grams per cell)

I put lithium in 6 new Cells in following proportions

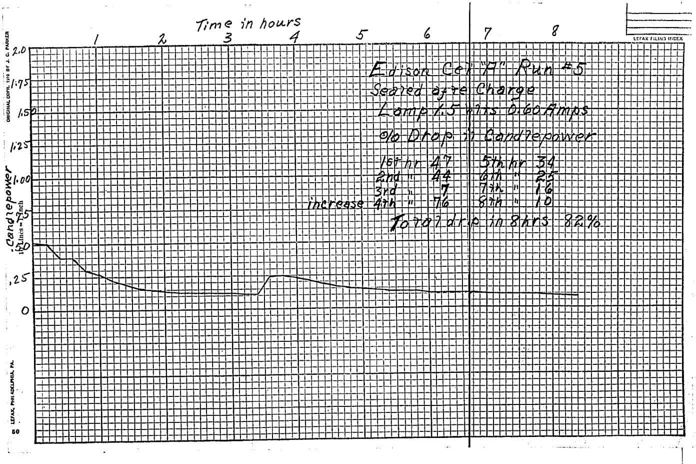
No 1 30 grams per liter
" 2 35 " " "
" 3 40 " " "
" 4 45 " " "
" 5 50 " " "
" 6 55 " " "

using 20½% KOH

Comparison of Old and new mine Lamp Head-pieces.

Old	New
45 parts	29 parts
141 operations (Approx)	86 operations (Approx)
weight 8½ oz	weight 6½ oz.
	Saves 16 parts, 55 operations, 2 ozs weight

[ITEM(S) FOUND IN BOOK]

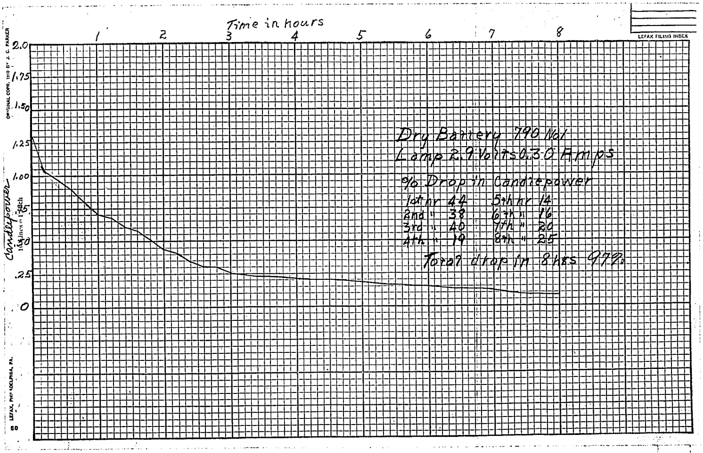


Edison Cell "A" Run #5
Sealed after Charge
Lamp 1.5 Volts 0.60 Amps
% Drop in Candlepower

	1st hr	47	5th hr	34
	2nd "	44	6th "	25
	3rd "	7	7th "	16
increase	4th "	76	8th "	10

Total drop in 8 hrs 82%

[ITEM(S) FOUND IN BOOK]



Dry Battery 790 No1
Lamp 2.9 Volts 0.30 Amps

% Drop in Candlepower

1st hr	44	5th hr	14
2nd "	38	6th "	16
3rd "	40	7th "	20
4th "	19	8th "	25

Total drop in 8 hrs 97%